



# George Erickson and the birth of the heat pipe

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As the Laboratory celebrates its 75th anniversary, it's a good time to reflect on one of the Laboratory's major scientific contributions, an innovation which has impacted everything from poultry to outer space.

In the 1960s, Laboratory scientist George Erickson thought a new device he was working on could fix the problem his family regularly faced around the holidays: their pre-convection era oven kept on producing a holiday turkey that was browned on the outside, but cold in the middle.

Facing another underdone dinner, Erickson grabbed a basic version of his work project that resembled a simple metal tube, and jammed it into the turkey before putting the bird back into the oven.

A well-roasted Butterball emerged minutes later, signaling a culinary triumph that hinged on the new technology of the [heat pipe](#).

George's tube held liquid and a wick-like material running from top to bottom. As the liquid heated up, it vaporized, condensing at the other end of the pipe and releasing heat into the turkey's core before traveling back via the wick to restart the journey. This process efficiently brought a consistent amount of heat to the turkey's core, cooking it evenly.

Within a short while, an Albuquerque company called Energy Conversion Systems, Inc. made a "thermal pin," which was essentially a commercial version of Erickson's homespun device, but applications for the technology were to go far beyond the kitchen.

Today, the heat pipe is one of the Laboratory's most widely used products, with applications on domestic, industrial and extraterrestrial scales. In fact, if you're reading this on a laptop, you're likely using one – it's radiating heat from the microchips under your keyboard.

Heat pipes at work in computer circuitry - just one of many uses.

More than 120,000 heat pipes are used along the 800-mile Trans-Alaskan Pipeline to create additional ground cooling to sustain the permafrost around the pipeline's support pylons.

Heat pipes also work well in zero-gravity environments and have been used to manage temperatures inside spacecraft, where heat generated by electronics can build up and damage equipment.

In 1996, the space shuttle Endeavor carried three Laboratory heat pipes that operated at temperatures above 900°F.

Recently, the Laboratory pioneered a new [Kilopower reactor](#), which leverages heat pipes to create a versatile power source in remote locations, like Mars.

Early practical heat pipes used mostly low-temperature working fluids like water, but more recent practical applications, like Kilopower, use liquid metals.

Although Laboratory physicists George Grover and Ted Cotter are largely credited with propelling the heat pipe into the science mainstream, it was George Erickson's hands-on production of the first prototype that formed the material basis for the device's eventual widespread use (not to mention his informal forays into kitchen equipment).

"Grover had the notion, but dad put the concept into practice," says George's son Andy (now a Lab researcher himself) says. "I have proof he built the first demonstrated heat pipes because the original blank is hanging on my wall."

The story goes that George whipped up the first heat pipe virtually on the spot after Cotter casually mentioned the concept in passing one afternoon.

"George built the first heat pipe in less than a day and tested it using heat lamps," says Lab researcher Bob Reid, who worked with Erickson and is still at the Laboratory today. "He went out, blew the glass, sealed it and put it all together, and Grover wasn't even aware he was working on it."

"He's what we used to call an 'inventor' at the Lab," Reid says, referring to George's creativity and practical skills. "George is the most effective inventor I've ever known."

According to Reid, it was George's radical curiosity and his need to explore ideas at an intrepid pace that made him a great innovator.

"I'm trying to grow my own crop of Georges to think his way and be curiosity-driven. We need more people in the Laboratory like George."

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